

PATENT ABSTRACTS OF JAPAN

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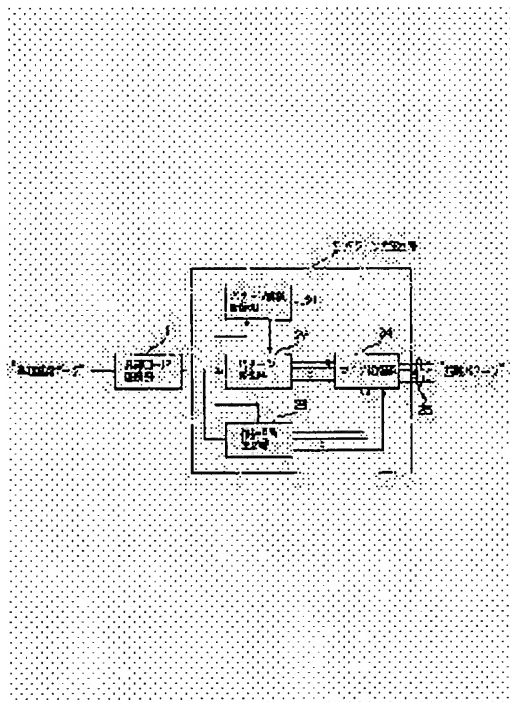
(72)Inventor : ISHIZAWA MAKOTO

(54) BURN-IN TESTING DEVICE

(57)Abstract:

PURPOSE: To simplify burn-in test for semiconductor integrated circuit.

CONSTITUTION: A burn-in testing device for semiconductor integrated circuit is provided with a kind code identifying part 1 for identifying the kind code of a semiconductor integrated circuit; a pattern information memory part 21 for housing the waveform information of a pattern signal necessary every kind code and the line information necessary for the pattern signal; a pattern generator 22 for generating the pattern signal from the waveform information; a signal generating part 23 for generating a connection signal from the line information; and a line connecting part 24 for connecting and supplying the pattern signal to a necessary line according to the connection signal. The semiconductor integrated circuit is installed to a test board, whereby the kind of the semiconductor integrated circuit is automatically judged, and a necessary pattern signal is supplied to a necessary pin. It is not required to provide the test board every kind of semiconductor integrated circuit, the replacing process is reduced, and the burn-in test is simplified.



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CLAIMS

[Claim(s)]

[Claim 1] The burn-in testing device for carrying out the burn-in trial of the semiconductor device which has form discernment data characterized by providing the following The form code discernment section which discriminates a form code from said form discernment data The pattern information storage section the wave information on the pattern signal corresponding to said form code and the Rhine information including the Rhine assignment which should supply this pattern signal were remembered to be The pattern generator which outputs at least one pattern signal according to said wave information The signal output part which supplies said outputted pattern signal to output Rhine corresponding to said Rhine assignment according to said Rhine information

[Claim 2] The burn-in testing device according to claim 1 characterized by consisting of the connection signal generation section in which said signal output part generates the Rhine connection signal according to said Rhine information, and a Rhine connection which connects to output Rhine corresponding to said Rhine assignment the signal line to which this Rhine connection signal is inputted into and said pattern signal is outputted.

[Claim 3] The burn-in testing device according to claim 1 or 2 characterized by said pattern generator consisting of channels of the number corresponding to the number of the pattern signals which have a wave which is mutually different.

[Claim 4] Claim 1 characterized by having the switching means which said Rhine connection makes flow through two or more input edges and the outgoing end which were arranged in the shape of a matrix, and this each input edge and an outgoing end, and the control section which controls this switching means thru/or a burn-in testing device given in 1 of 3.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the burn-in testing device for performing a burn-in trial, giving in more detail the pattern signal which consists of the signal which changes to the input of a semiconductor integrated circuit with the predetermined electrical potential difference or time amount of fixed level about a burn-in testing device.

[0002]

[Description of the Prior Art] In a semiconductor integrated circuit, in order to guarantee the dependability of a product by losing initial failure etc., the dependability accelerated test called a burn in test is performed. The stress to which a semiconductor integrated circuit changes from high predetermined temperature and supply voltage in this burn in test is added at worst, and actualization of a poor potential part is accelerated. The product which has the defect part which actualized the semiconductor integrated circuit after the burn-in trial by the continuing operational test is eliminated, and the dependability is secured.

[0003] After impressing high predetermined supply voltage as an electrical circuit for accelerating actualization of a defect part, a static-burn-in trial of only maintaining all the contact pins of an integrated circuit on a fixed electrical potential difference and the dynamic burn in test which impresses the signal pattern for actuation to all the contact pins or predetermined contact pins of an integrated circuit are contained in a burn in test. Generally, these burn-in trial is performed to this using the trial board which supplies the signal for a test while it carries a semiconductor integrated circuit in a burn-in furnace.

[0004] The contact pins with which the test signal is supplied to the class list of the test signal which generally consists of the electrical potential difference of fixed level and pattern wave which are impressed in the case of a burn-in trial differ for every class of semiconductor integrated circuit. For this reason, that from which the pattern generator and trial board which generate a test signal differ for every class of semiconductor integrated circuit, respectively is used.

[0005]

[Problem(s) to be Solved by the Invention] The class of semiconductor integrated circuit is in the inclination which increases increasingly in recent years, and since there are especially many the classes in the case of semiconductor integrated circuits, such as a gate array, there are very many classes of trial board used in the case of a burn-in trial. For this reason, costs required for a burn-in trial increase by the cost of the trial board itself, and the man day of that exchange. However, the reducible burn-in testing device was not effectively known in the class of conventional, for example, trial, board.

[0006] Since this invention does not need to prepare a different trial board for every class of semiconductor integrated circuit in view of the problem of the above-mentioned conventional burn-in trial, it aims at offering the burn-in testing device which can reduce the costs which can reduce the number of trial boards, therefore start a burn-in trial.

[0007]

[Means for Solving the Problem] In order to attain said purpose, the burn-in testing device of this invention In the burn-in testing device for carrying out the burn-in trial of the semiconductor device which has form discernment data The form code discernment section which discriminates a form code from said form discernment data, The pattern information storage section the wave information on the pattern signal corresponding to said form code and the Rhine information including the Rhine assignment which should supply this pattern signal were remembered to be, According to said wave information, it is characterized by having the pattern generator which outputs at least one pattern signal, and the signal output part which supplies said outputted pattern signal to output Rhine corresponding to said Rhine assignment according to said Rhine information.

[0008] Here, what supplies the electrical potential difference of fixed level other than the pattern generator made to generate the usual test pattern which constitutes a stimulus to the predetermined contact pin of a semiconductor device is contained in the "pattern generator" used on these specifications. Moreover, a pattern generator includes the case where it is one pattern generator which consists of sets of the signal generation channel to which each outputs the electrical potential difference of a pattern signal or fixed level, when each is constituted by the set of two or more pattern generators which output the electrical potential difference of one pattern signal or fixed level.

[0009]

[Function] A burn-in trial is performed without needing a different trial board for every class of semiconductor integrated circuit, since the Rhine information which specifies Rhine which should supply the wave information on a pattern signal required for a burn-in trial and its pattern signal is supplied to Rhine for which each generated pattern signal needs it, respectively while being read from the pattern information-storage section by the judgment result of a form code and being generated a pattern signal based on each [these] information.

[0010]

[Example] With reference to a drawing, this invention is explained in more detail. Drawing 1 is the block diagram showing the configuration of the burn-in testing device of one example of this invention. In this drawing, this burn-in testing device consists of the form code discernment section 1 and a pattern generating circuit 2, and the pattern generating circuit 1 consists of the pattern information storage section 21, a pattern generator 22, the connection signal generation section 23, and the Rhine connection 24. A pattern generator 22 has the same number of channels as the number of output Rhine 25 of the Rhine connection 24, and generates one pattern signal by each channel, respectively.

[0011] The form discernment data of an examined semiconductor integrated circuit are inputted, and the form code discernment section 1 identifies the form code which will, from now on, show the class of semiconductor integrated circuit. In the case of this example, a form code is identified by reading the signal which the form code discernment section 1 inputs the signal for predetermined discernment into a semiconductor integrated circuit, answers this, and is outputted from a semiconductor integrated circuit. In addition, it replaces with this, the code number corresponding to a form is recorded on a semiconductor integrated circuit, and the configuration whose form code discernment section 1 reads this can also be adopted.

[0012] A pattern generator 22 is equipped with various channels, such as a channel which outputs the electrical potential difference of fixed level, a channel which generates the clock signal of a predetermined frequency, or a channel which generates a special pattern. In response to the output of the form code discernment section 1, a pattern generator 22 pulls out the wave of a required pattern signal from the wave information stored in the pattern information storage section 21, and, thereby, generates a required pattern signal by each corresponding channel. This wave information is stored as a format of a table with a required pattern signal for every contact pin of a form code and a semiconductor integrated circuit.

[0013] The connection signal generation section 23 generates the Rhine connection signal from the Rhine information stored in the pattern information storage section 21. The Rhine information is stored as a format of the table for every form code which specifies Rhine or the contact pin which should supply each pattern signal. The Rhine connection signal formed of the connection signal generation section 23 can be made into the signal which controls a flow with output Rhine which should be connected to each input line of the Rhine connection 24, and this.

[0014] The Rhine connection 24 makes change connection of each output Rhine at a predetermined input line, in order to supply each pattern signal to required Rhine in response to each pattern signal outputted from a pattern generator 22, and the Rhine connection signal outputted from the connection signal generation section 23. In the case of this example, the number of inputs and the number of outputs of the Rhine connection 24 are the same number.

[0015] Drawing 2 is a typical sectional view which illustrates the burn-in test kiln which adopts the burn-in testing device of the example of drawing 1, for example, performs a dynamic burn-in trial. In this drawing, the socket 10 of the trial board 9 is equipped with a contact pin, and the examined semiconductor integrated circuit 3 is attached in the trial board 9 held in the interior of a furnace. In order to supply a predetermined pattern to a semiconductor integrated circuit 3, the form code discernment section 1 and the pattern generating circuit 2 are formed outside a furnace. As for the inside of a furnace, and furnace outside, wiring is connected by the connector 8.

[0016] The form discrimination decision circuit 4 which contains form discernment data in circuitry is established in the chip of the examined semiconductor integrated circuit 3, and the form code discernment section 1 outputs the signal for detection for form discernment to it via a signal line 5. From the form discrimination decision circuit 4, this is answered and the output for identifying a form code is inputted into the form code discernment section 1 via a signal line 5.

[0017] The form code obtained in the form code discernment section 1 is inputted into the pattern generating circuit 2 via a signal line 6. The pattern generating circuit 2 generates a pattern signal required for the burn-in trial of the examined semiconductor integrated circuit 3 based on this form code. Each acquired pattern signal is supplied to the contact pin of a semiconductor integrated circuit 3 via the printed circuit 7 of a connector 8 and the trial board 9, and the socket 10 of the trial board 9.

[0018] By adopting the above-mentioned configuration, each pattern signals of all generated in the pattern generating circuit 2 are supplied to the contact pin with which a semiconductor integrated circuit 3 corresponds. The always same thing can be used for the trial board 9 irrespective of a difference of the class of semiconductor integrated circuit 3 on the assumption that the configuration of a contact pin suits a socket 10. Therefore, the same trial board can also be adopted by each static and dynamic burn-in trial, and it is not necessary to change the class of trial board according to the class of semiconductor integrated circuit. For this reason, the man day for the trial board exchange which was required at every trial can also reduce the class of trial board, and reduction of the number conventionally from the first. Moreover, the mistake of mistaking the format of a trial board is not produced, either.

[0019] Drawing 3 is the same drawing as drawing 2 which shows the configuration of the burn-in testing device of the second example of this invention. With the burn-in testing device of the second example, the matrix box 11 which accomplishes the Rhine connection is established in the exterior of the pattern generating circuit 20, and the configuration of the matrix box 11 differs from the burn-in testing device of the first example in that the Rhine connection 24 and configuration of drawing 1 differ from each other.

[0020] Drawing 4 is the circuit diagram showing the configuration of the matrix box 11. output matrix line 2a by which the matrix box 11 was connected to a decoder 12, the input matrix lines 1a, 1b, and 1c connected to the input terminal 13, and an output terminal 14 in this drawing, 2b, and ... it consists of 2f and a switch 15 which makes it flow through each matrix line.

[0021] A mutually different wave-like pattern signal is inputted into each input matrix lines 1a, 1b, and 1c via an input terminal 13. a decoder 12 -- each output matrix line 2a, 2b, and ... the decoder blocks a and b corresponding to 2f, and ... it consists of f. each decoder blocks a and b and ... each output matrix line 2a to which f corresponds in response to the Rhine connection signal,

*2b, and ... three switches 15 which make either of the input matrix lines flow through 2f are controlled. output matrix line 2a for which each pattern input which is different by this in mutual [which was given from the input terminal 13 / wave-like] needs each, 2b, and ... it is outputted via 2f.

[0022] According to the configuration of the second example of the above, since it is only sufficient to have a pattern signal generation channel for every wave-like class of pattern signal, as compared with the pattern generator 22 of the first example, a pattern generator 20 has few channels and it is sufficient for it. Therefore, a burn-in testing device can be miniaturized and there is an advantage that it can manufacture by low cost.

[0023] Conventionally, in IC circuit tester, form discernment data were recorded on the interior of a semiconductor integrated circuit, and the example which chooses the optimal program and a test pattern from this data automatically for every semiconductor integrated circuit was seen. Moreover, in the burn-in testing device, the method which chooses supply voltage automatically is tried by specifying the code of a trial board. However, while discriminating a form code from form discernment data and generating a pattern signal automatically in a burn-in testing device like this invention, the example which chooses automatically Rhine which supplies the pattern signal, and is connected is not known. While simplifying the process of a burn-in trial static [especially the burn-in testing device of this invention], and dynamic, it has a big advantage by reducing the classes of the trial board.

[0024] All of the configuration of each above-mentioned example are only instantiation. Therefore, the burn-in testing device obtained from each [these] example by making various modification and corrections is also contained in the burn-in testing device of this invention.

[0025]

[Effect of the Invention] Since the classes of trial board required for a burn-in testing device are reducible according to the burn-in testing device of this invention as explained above and not only reduction of the costs of the trial board itself but the man day of exchange of a trial board is reducible, a burn-in trial is simplified and the remarkable effectiveness that the cost can be reduced is done so.

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TECHNICAL FIELD

[Industrial Application] This invention relates to the burn-in testing device for performing a burn-in trial, giving in more detail the pattern signal which consists of the signal which changes to the input of a semiconductor integrated circuit with the predetermined electrical potential difference or time amount of fixed level about a burn-in testing device.

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PRIOR ART

[Description of the Prior Art] In a semiconductor integrated circuit, in order to guarantee the dependability of a product by losing initial failure etc., the dependability accelerated test called a burn in test is performed. The stress to which a semiconductor integrated circuit changes from high predetermined temperature and supply voltage in this burn in test is added at worst, and actualization of a poor potential part is accelerated. The product which has the defect part which actualized the semiconductor integrated circuit after the burn-in trial by the continuing operational test is eliminated, and the dependability is secured.

[0003] After impressing high predetermined supply voltage as an electrical circuit for accelerating actualization of a defect part, a static-burn-in trial of only maintaining all the contact pins of an integrated circuit on a fixed electrical potential difference and the dynamic burn in test which impresses the signal pattern for actuation to all the contact pins or predetermined contact pins of an integrated circuit are contained in a burn in test. Generally, these burn-in trial is performed to this using the trial board which supplies the signal for a test while it carries a semiconductor integrated circuit in a burn-in furnace.

[0004] The contact pins with which the test signal is supplied to the class list of the test signal which generally consists of the electrical potential difference of fixed level and pattern wave which are impressed in the case of a burn-in trial differ for every class of semiconductor integrated circuit. For this reason, that from which the pattern generator and trial board which generate a test signal differ for every class of semiconductor integrated circuit, respectively is used.

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EFFECT OF THE INVENTION

[Effect of the Invention] Since the classes of trial board required for a burn-in testing device are reducible according to the burn-in testing device of this invention as explained above and not only reduction of the costs of the trial board itself but the man day of exchange of a trial board is reducible, a burn-in trial is simplified and the remarkable effectiveness that the cost can be reduced is done so.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] The class of semiconductor integrated circuit is in the inclination which increases increasingly in recent years, and since there are especially many the classes in the case of semiconductor integrated circuits, such as a gate array, there are very many classes of trial board used in the case of a burn-in trial. For this reason, costs required for a burn-in trial increase by the cost of the trial board itself, and the man day of that exchange. However, the reducible burn-in testing device was not effectively known in the class of conventional, for example, trial, board.

[0006] Since this invention does not need to prepare a different trial board for every class of semiconductor integrated circuit in view of the problem of the above-mentioned conventional burn-in trial, it aims at offering the burn-in testing device which can reduce the costs which can reduce the number of trial boards, therefore start a burn-in trial.

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MEANS

[Means for Solving the Problem] In order that this invention may attain said purpose, it is characterized by a burn-in testing device for the burn-in testing device of this invention carrying out the burn-in trial of the semiconductor device which has form discernment data possessing the following. The form code discernment section which discriminates a form code from said form discernment data The pattern information storage section the wave information on the pattern signal corresponding to said form code and the Rhine information including the Rhine assignment which should supply this pattern signal were remembered to be The pattern generator which outputs at least one pattern signal according to said wave information The signal output part which supplies said outputted pattern signal to output Rhine corresponding to said Rhine assignment according to said Rhine information

[0008] Here, what supplies the electrical potential difference of fixed level other than the pattern generator made to generate the usual test pattern which constitutes a stimulus to the predetermined contact pin of a semiconductor device is contained in the "pattern generator" used on these specifications. Moreover, a pattern generator includes the case where it is one pattern generator which consists of sets of the signal generation channel to which each outputs the electrical potential difference of a pattern signal or fixed level, when each is constituted by the set of two or more pattern generators which output the electrical potential difference of one pattern signal or fixed level.

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OPERATION

[Function] A burn-in trial is performed without needing a different trial board for every class of semiconductor integrated circuit, since the Rhine information which specifies Rhine which should supply the wave information on a pattern signal required for a burn-in trial and its pattern signal is supplied to Rhine for which each generated pattern signal needs it, respectively while being read from the pattern information-storage section by the judgment result of a form code and being generated a pattern signal based on each [these] information.

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EXAMPLE

[Example] With reference to a drawing, this invention is explained in more detail. Drawing 1 is the block diagram showing the configuration of the burn-in testing device of one example of this invention. In this drawing, this burn-in testing device consists of the form code discernment section 1 and a pattern generating circuit 2, and the pattern generating circuit 1 consists of the pattern information storage section 21, a pattern generator 22, the connection signal generation section 23, and the Rhine connection 24. A pattern generator 22 has the same number of channels as the number of output Rhine 25 of the Rhine connection 24, and generates one pattern signal by each channel, respectively.

[0011] The form discernment data of an examined semiconductor integrated circuit are inputted, and the form code discernment section 1 identifies the form code which will, from now on, show the class of semiconductor integrated circuit. In the case of this example, a form code is identified by reading the signal which the form code discernment section 1 inputs the signal for predetermined discernment into a semiconductor integrated circuit, answers this, and is outputted from a semiconductor integrated circuit. In addition, it replaces with this, the code number corresponding to a form is recorded on a semiconductor integrated circuit, and the configuration whose form code discernment section 1 reads this can also be adopted.

[0012] A pattern generator 22 is equipped with various channels, such as a channel which outputs the electrical potential difference of fixed level, a channel which generates the clock signal of a predetermined frequency, or a channel which generates a special pattern. In response to the output of the form code discernment section 1, a pattern generator 22 pulls out the wave of a required pattern signal from the wave information stored in the pattern information storage section 21, and, thereby, generates a required pattern signal by each corresponding channel. This wave information is stored as a format of a table with a required pattern signal for every contact pin of a form code and a semiconductor integrated circuit.

[0013] The connection signal generation section 23 generates the Rhine connection signal from the Rhine information stored in the pattern information storage section 21. The Rhine information is stored as a format of the table for every form code which specifies Rhine or the contact pin which should supply each pattern signal. The Rhine connection signal formed of the connection signal generation section 23 can be made into the signal which controls a flow with output Rhine which should be connected to each input line of the Rhine connection 24, and this.

[0014] The Rhine connection 24 makes change connection of each output Rhine at a predetermined input line, in order to supply each pattern signal to required Rhine in response to each pattern signal outputted from a pattern generator 22, and the Rhine connection signal outputted from the connection signal generation section 23. In the case of this example, the number of inputs and the number of outputs of the Rhine connection 24 are the same number.

[0015] Drawing 2 is a typical sectional view which illustrates the burn-in test kiln which adopts the burn-in testing device of the example of drawing 1, for example, performs a dynamic burn-in trial. In this drawing, the socket 10 of the trial board 9 is equipped with a contact pin, and the examined semiconductor integrated circuit 3 is attached in the trial board 9 held in the interior of a furnace. In order to supply a predetermined pattern to a semiconductor integrated circuit 3, the form code discernment section 1 and the pattern generating circuit 2 are formed outside a furnace. As for the inside of a furnace, and furnace outside, wiring is connected by the connector 8.

[0016] The form discrimination decision circuit 4 which contains form discernment data in circuitry is established in the chip of the examined semiconductor integrated circuit 3, and the form code discernment section 1 outputs the signal for detection for form discernment to it via a signal line 5. From the form discrimination decision circuit 4, this is answered and the output for identifying a form code is inputted into the form code discernment section 1 via a signal line 5.

[0017] The form code obtained in the form code discernment section 1 is inputted into the pattern generating circuit 2 via a signal line 6. The pattern generating circuit 2 generates a pattern signal required for the burn-in trial of the examined semiconductor integrated circuit 3 based on this form code. Each acquired pattern signal is supplied to the contact pin of a semiconductor integrated circuit 3 via the printed circuit 7 of a connector 8 and the trial board 9, and the socket 10 of the trial board 9.

[0018] By adopting the above-mentioned configuration, each pattern signals of all generated in the pattern generating circuit 2 are supplied to the contact pin with which a semiconductor integrated circuit 3 corresponds. The always same thing can be used for the trial board 9 irrespective of a difference of the class of semiconductor integrated circuit 3 on the assumption that the configuration of a contact pin suits a socket 10. Therefore, the same trial board can also be adopted by each static and dynamic burn-in trial, and it is not necessary to change the class of trial board according to the class of semiconductor integrated circuit. For this reason, the man day for the trial board exchange which was required at every trial can also reduce the class of trial board, and reduction of the number conventionally from the first. Moreover, the mistake of mistaking the format of a trial board is not produced, either.

[0019] Drawing 3 is the same drawing as drawing 2 which shows the configuration of the burn-in testing device of the second example of this invention. With the burn-in testing device of the second example, the matrix box 11 which accomplishes the Rhine connection is established in the exterior of the pattern generating circuit 20, and the configuration of the matrix box 11 differs from the burn-in testing device of the first example in that the Rhine connection 24 and configuration of drawing 1 differ from each other.

[0020] Drawing 4 is the circuit diagram showing the configuration of the matrix box 11. output matrix line 2a by which the matrix box 11 was connected to a decoder 12, the input matrix lines 1a, 1b, and 1c connected to the input terminal 13, and an output terminal 14 in this drawing, 2b, and ... it consists of 2f and a switch 15 which makes it flow through each matrix line.

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[0024] All of the configuration of each above-mentioned example are only instantiation. Therefore, the burn-in testing device obtained from each [these] example by making various modification and corrections is also contained in the burn-in testing device of this invention.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing the configuration of the burn-in testing device of the first example of this invention.

[Drawing 2] It is the sectional view of the burn-in test kiln which adopts the burn-in testing device of drawing 1.

[Drawing 3] It is the sectional view of the burn-in test kiln which adopts the burn-in testing device of the second example of this invention.

[Drawing 4] It is the circuit diagram showing the configuration of the matrix box in the burn-in testing device of drawing 3.

[Description of Notations]

- 1 Form Code Discernment Section
- 2 20 Pattern generating circuit
- 21 Pattern Information Storage Section
- 22 Pattern Generator
- 23 Connection Signal Generation Section
- 24 Rhine Connection
- 3 Examined Semiconductor Integrated Circuit
- 4 Form Discrimination Decision Circuit
- 5, 6, 7 Signal line
- 8 Socket
- 9 Trial Board
- 10 Socket
- 11 Matrix Box

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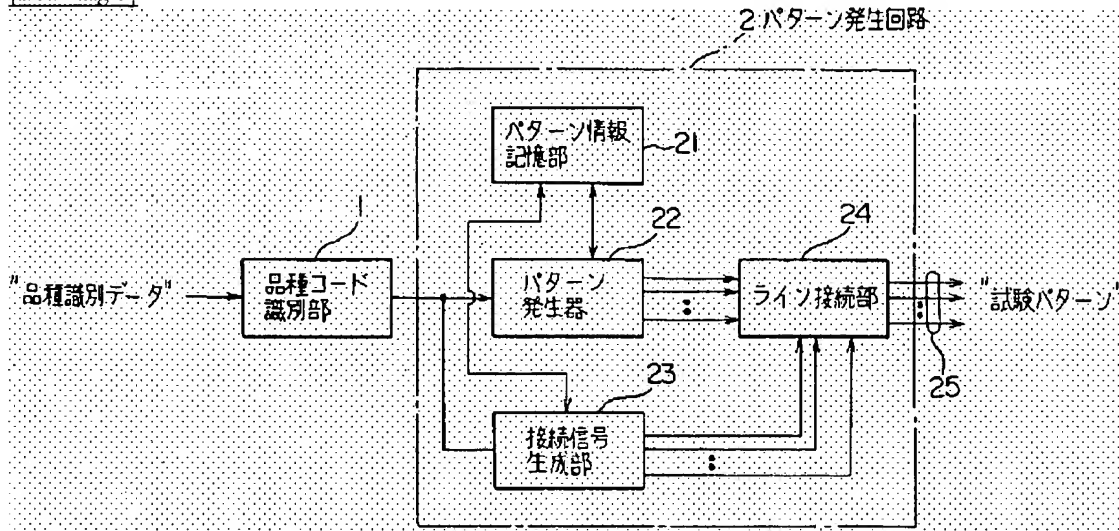
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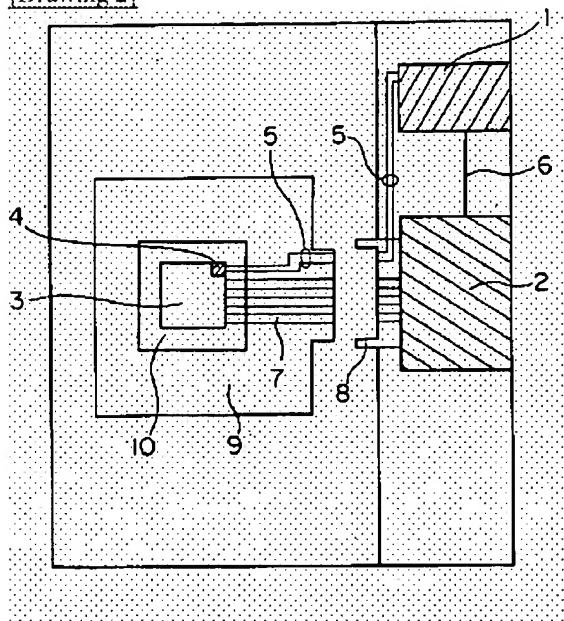
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DRAWINGS

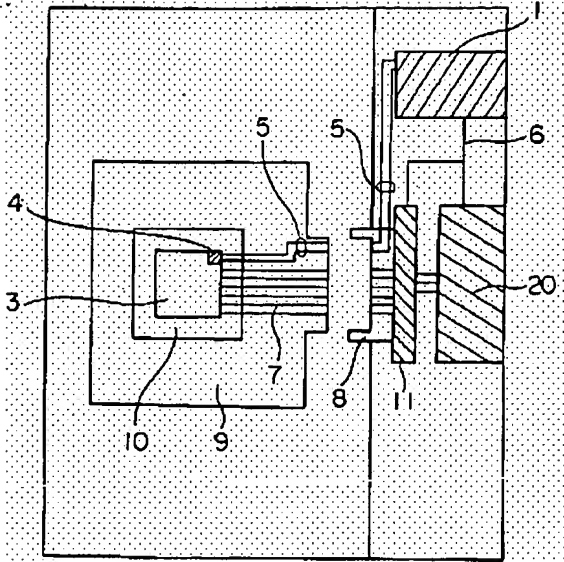
[Drawing 1]



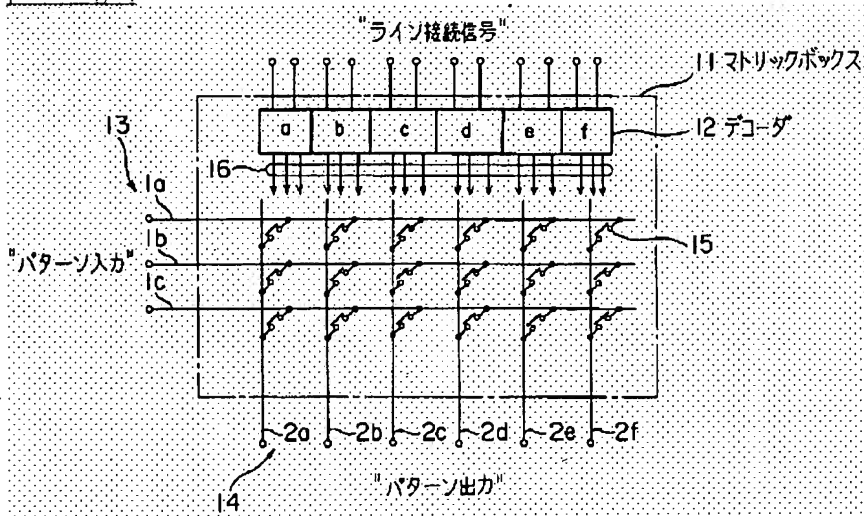
[Drawing 2]



[Drawing 3]



[Drawing 4]



[Translation done.]